July 1999 Midwest Region Climate Report

National Oceanic and Atmospheric Administration

National Climatic Data Center

Extreme Events

A major derecho event occurred in northern Minnesota on July 4, 1999. Starting on the western border with North Dakota, a radar bow echo moved at 60 mph across the states to the east. On the border with Minnesota, Fargo, ND, reported winds greater than 58 mph were sustained for 45 minutes, and winds greater than 70 mph were sustained for 10 minutes. Wind gusts were measured at 80 mph in Hibbing, MN, the largest city in its path in northeastern Minnesota. Winds easily reached 100 mph in the Arrowhead region of Minnesota, based on the damage observed. The Boundary Waters Canoe Area Wilderness was most severely damaged by winds. A swath 10 to 12 miles wide and 30 to 35 miles long suffered 90% or greater blowdown in forested regions. Trees hundreds of years old and many feet in diameter were felled. An estimated 12.5 million trees were lost, leaving thousands of hikers and canoeists trapped with 10 foot high piles of trees blocking the paths. One camper was killed, and many dozens more were injured by falling trees. Approximately 20 campers needed to be evacuated by helicopter due to severe injuries. Interestingly, since this was a natural event in a wilderness area, the tree losses were not added to the list of economic losses. At the same time, infrastructure losses and expenses to open blocked roads, paths, and campgrounds are included in damage estimates. More than $5 million damage was done to electrical cooperatives alone due to wind-snapped telephone poles and downed lines.

During the derecho passage, copious amounts of rain fell, causing widespread flooding in northern Minnesota. Hibbing, MN, received 4.35 inches of rain in just three hours and 7.68 inches in 24 hours; both totals exceeded the 100 year recurrence interval for the region. Hibbing received a total of 13.37 inches of rain in July, which is a new record. Flash flooding closed 85 percent of the county roads in the area, and caused considerable infrastructure and property damage. About 1500 homes were damaged by flooding, and many roads were washed out. The latest estimate for the public infrastructure repairs is $14.3 million for both flood and wind damages. The private property damage will add millions more to that total. Three counties were declared federal disaster areas for individual and public assistance, while five other counties received public assistance only.

The north central and northeastern Iowa region has had three major flooding events to date in 1999. Due to eight inches or more of rain on May 16th, heavy flooding resulted

along a number of rivers, including the Cedar and Wapsipinicon Rivers. Nearly 2000 homes were damaged, and state officials estimated that approximately $11 million of damage occurred to public infrastructure. The total losses of public, private, and agricultural interests were thought to be about $100 million by state officials. On July 2nd and 3rd, a series of tremendous storms with tornadoes dumped up to another 9 inches of rain on similar reaches of north central Iowa rivers, resulting in more local flash flooding and major river flooding. Four counties were declared federal disaster areas in this flood, which resulted in more than $4 million of public infrastructure damage. Federal disaster declarations were extended to a total of 8 counties in north-central and eastern Iowa.

On July 18-21, north central and northeastern Iowa received another series of training thunderstorms along a stationary front that produced even more rain than the first two events, on top of saturated grounds in drainage basins with rivers still running above normal stages. Local emergency management officials state that the town of Manly, IA, in north central Iowa received 13 inches of rain in the 24 hours ending at 7 AM on July 19th. The radar estimate for this event was more than 10 inches. A two-county area centered on Charles City, IA, received 6 to 10 inches of rain during the 24 hours ending at 7 AM on July 21st. Both of these figures exceed the 100 year recurrence interval for the given time interval. Major flooding occurred again along the Cedar and Wapsipinicon Rivers, as well as the Shell Rock River, and continued on into the Iowa River. The communities of Manly, Rock Falls, Nora Springs, Rockford, Charles City, Waverly, and Cedar Falls were especially hard hit. The flood stage in Waverly came within 3 inches of the top of the 100 year flood plain in that community along the Cedar River. Due to excellent warnings down river, only one person died in the floods, although thousands were evacuated at various times, and thousands of properties were damaged, some for the second or even third time this year. State disaster officials in Iowa believe that the final total for public, private, and agricultural damage for the latest floods may exceed the $100 million figure for the May event when final figures are released in the fall.

Temperature and Precipitation Anomalies

The entire Midwest was above normal in temperature for the month of July 1999, with the last ten days consisting of a major heat wave. Mean temperature anomalies varied from +2°F in the western states of the region to +4°F to +5°F in Indiana, Kentucky, and Ohio. This was the 8th warmest July on record out of 105 years for the Midwestern Region. July was the 4th warmest in Ohio, 6th warmest in Kentucky, 7th warmest in Indiana, 8th warmest in Michigan and Wisconsin, and between the 11th and 15th warmest in the other Midwestern states. Through July 21, the month was actually fairly close to normal in temperature in the western half of the region, with only the drought stricken east above normal in temperature. However, in the period July 22nd to 31st, the heat

wave covered all but the northern edge of the Midwest. As a ten-day average, both maximum and minimum temperatures were 7°F to 11°F above normal. The peak of the heat struck on July 29th and 30th in most of the Midwest. The minimum temperatures on the 30th were above 70°F in the entire region except for the northern portions of Minnesota, Wisconsin, and Michigan. Minimums exceeded 78°F in urban heat islands like Chicago, St. Louis, and Cincinnati, where many heat related deaths occurred. The maximum temperature exceeded 100°F in many of these same cities, with most of the Midwest recording maximums 10°F to 20°F above normal. The substantial temperatures were accompanied by dew points in the upper 70s to lower 80s°F, strong solar radiation, and light winds, all making for a deadly combination that eventually claimed 232 lives in the nine Midwestern states.

The precipitation story in the Midwest was also interesting in July 1999. The region as a whole experienced its 25th wettest July, as the flooding rains in Iowa, Minnesota, and Wisconsin more than made up for the lack of rain elsewhere in the Midwest. The influence of the Bermuda high helped to turn the jet stream north of most of the region, after a brief diversion southward over the western third of the Midwest. Perhaps it is more useful to look separately at the regions having drought conditions and flood conditions. Wisconsin endured its wettest July in 105 years of records, with the state average precipitation total exceeding 8 inches. Minnesota had its 3rd wettest July based mainly on two severe events striking its southeast and northeast quadrants. Northern Iowa and Michigan also received above normal precipitation totals, with much of the northern Iowa rain occurring during the same extreme event affecting southeastern Minnesota. On the other hand, Kentucky had its 6th driest July, and the remaining states received only 66 to 88% of their normal precipitation totals. This lack of rain intensified the drought conditions that began in Ohio and Kentucky in June, and spread the drought westward to Indiana, Illinois, Missouri, and southern Iowa.

Agricultural Impacts

Soil moisture levels in the Midwest display a sharp gradient from the northwest to the south and east. By the end of July, the topsoil was extremely dry in Missouri, Illinois, Indiana, Ohio, and Kentucky, where 68 to 89% of each state reporting very short or short moisture conditions. Even southern Iowa was becoming dry, contributing to that state reporting 35% very short or short topsoil moisture conditions. Michigan was also at 35% very short or short topsoil, especially in its southern portion. On the other hand, crop destruction occurred in northeastern Iowa due to floods and water ponding in low topography. Minnesota, Wisconsin, and much of Michigan and Iowa have adequate to surplus topsoil moisture available.

The increasing drought in the Midwest during July has reduced by about 15% the proportion of corn and soybean plantings that are graded as being in good or excellent condition. However, 63% of corn and 57% of soybeans in the major producing states are still in good to excellent condition. This is mainly due to good weather and a lack of extreme heat earlier in the month when the critical fertilization phase of plant development occurred. Both corn and soybeans have progressed faster than normal in their phenological phases. Most of the dry areas of the Midwest are only a few inches of rain behind normal, and can recover to good condition if rain occurs soon. However, some parts of Ohio and Kentucky are more than 7 inches of precipitation behind what is needed, and will take quite a lot of rain to recover. Unless August is wetter than normal, crop yield levels will not recover in drought stricken areas. (The Weekly Weather and Crop Bulletin is a major source for this information).

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